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(54) Title: MICROEMULSION LIGHT DUTY LIQUID CLEANING COMPOSITIONS		
(57) Abstract		
<p>A microemulsion light duty liquid detergent with desirable cleansing properties and mildness to the human skin comprising: a C₈₋₁₈ ethoxylated alkyl ether sulfate anionic surfactant, a sulfonate anionic surfactant, an alkyl polyglucoside surfactant, and a betaine surfactant and/or amine oxide surfactant, a cosurfactant, a water insoluble hydrocarbon, essential oil or perfume, water and optionally a C₈₋₁₈ mono or dialkoxylated alkylamide.</p>		

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MICROEMULSION LIGHT DUTY LIQUID CLEANING COMPOSITIONS

Background of the Invention

In recent years all-purpose liquid detergents have become widely accepted for
5 cleaning hard surfaces, e.g., painted woodwork and panels, tiled walls, wash bowls,
bathtubs, linoleum or tile floors, washable wall paper, etc. Such all-purpose liquids
comprise clear and opaque aqueous mixtures of water-soluble organic detergents and
water-soluble detergent builder salts. In order to achieve comparable cleaning
efficiency with granular or powdered all-purpose cleaning compositions, use of water-
10 soluble inorganic phosphate builder salts was favored in the prior art all-purpose
liquids. For example, such early phosphate-containing compositions are described in
U.S. Patent Nos. 2,560,839; 3,234,138; 3,350,319; and British Patent No. 1,223,739.

In view of the environmentalist's efforts to reduce phosphate levels in ground
water, improved all-purpose liquids containing reduced concentrations of inorganic
15 phosphate builder salts or non-phosphate builder salts have appeared. A particularly
useful self-opacified liquid of the latter type is described in U.S. Patent No. 4,244,840.

However, these prior art all-purpose liquid detergents containing detergent
builder salts or other equivalent tend to leave films, spots or streaks on cleaned
unrinsed surfaces, particularly shiny surfaces. Thus, such liquids require thorough
20 rinsing of the cleaned surfaces which is a time-consuming chore for the user.

In order to overcome the foregoing disadvantage of the prior art all-purpose
liquid, U.S. Patent No. 4,017,409 teaches that a mixture of paraffin sulfonate and a
reduced concentration of inorganic phosphate builder salt should be employed.
However, such compositions are not completely acceptable from an environmental
25 point of view based upon the phosphate content. On the other hand, another
alternative to achieving phosphate-free all-purpose liquids has been to use a major
proportion of a mixture of anionic and nonionic detergents with minor amounts of glycol
ether solvent and organic amine as shown in U.S. Patent No. 3,935,130. Again, this
approach has not been completely satisfactory and the high levels of organic

detergents necessary to achieve cleaning cause foaming which, in turn, leads to the need for thorough rinsing which has been found to be undesirable to today's consumers.

Another approach to formulating hard surface or all-purpose liquid detergent composition where product homogeneity and clarity are important considerations involves the formation of oil-in-water (o/w) microemulsions which contain one or more surface-active detergent compounds, a water-immiscible solvent (typically a hydrocarbon solvent), water and a "cosurfactant" compound which provides product stability. By definition, an o/w microemulsion is a spontaneously forming colloidal dispersion of "oil" phase particles having a particle size in the range of 25 to 800 Å in a continuous aqueous phase.

In view of the extremely fine particle size of the dispersed oil phase particles, microemulsions are transparent to light and are clear and usually highly stable against phase separation.

Patent disclosures relating to use of grease-removal solvents in o/w microemulsions include, for example, European Patent Applications EP 0137615 and EP 0137616 - Herbots et al; European Patent Application EP 0160762 - Johnston et al; and U.S. Patent No. 4,561,991 - Herbots et al. Each of these patent disclosures also teaches using at least 5% by weight of grease-removal solvent.

It also is known from British Patent Application GB 2144763A to Herbots et al, published March 13, 1985, that magnesium salts enhance grease-removal performance of organic grease-removal solvents, such as the terpenes, in o/w microemulsion liquid detergent compositions. The compositions of this invention described by Herbots et al. require at least 5% of the mixture of grease-removal solvent and magnesium salt and preferably at least 5% of solvent (which may be a mixture of water-immiscible non-polar solvent with a sparingly soluble slightly polar solvent) and at least 0.1% magnesium salt.

However, since the amount of water immiscible and sparingly soluble components which can be present in an o/w microemulsion, with low total active

ingredients without impairing the stability of the microemulsion is rather limited (for example, up to 18% by weight of the aqueous phase), the presence of such high quantities of grease-removal solvent tend to reduce the total amount of greasy or oily soils which can be taken up by and into the microemulsion without causing phase separation.

The following representative prior art patents also relate to liquid detergent cleaning compositions in the form of o/w microemulsions: U.S. Patents Nos. 4,472,291 - Rosario; 4,540,448 - Gauteer et al; 3,723,330 - Sheflin; etc.

Liquid detergent compositions which include terpenes, such as d-limonene, or other grease-removal solvent, although not disclosed to be in the form of o/w microemulsions, are the subject matter of the following representative patent documents: European Patent Application 0080749; British Patent Specification 1,603,047; 4,414,128; and 4,540,505. For example, U.S. Patent No. 4,414,128 broadly discloses an aqueous liquid detergent composition characterized by, by weight:

(a) from 1% to 20% of a synthetic anionic, nonionic, amphoteric or zwitterionic surfactant or mixture thereof;

(b) from 0.5% to 10% of a mono- or sesquiterpene or mixture thereof, at a weight ratio of (a):(b) lying in the range of 5:1 to 1:3; and

(c) from 0.5% to 10% of a polar solvent having a solubility in water at 15°C in the range of from 0.2% to 10%. Other ingredients present in the formulations disclosed in this patent include from 0.05% to 2% by weight of an alkali metal, ammonium or alkanolammonium soap of a C₁₃-C₂₄ fatty acid; a calcium sequestrant from 0.5% to 13% by weight; nonaqueous solvent, e.g., alcohols and glycol ethers, up to 10% by weight; and hydrotropes, e.g., urea, ethanolamines, salts of lower alkylaryl sulfonates, up to 10% by weight. All of the formulations shown in the Examples of this patent include relatively large amounts of detergent builder salts which are detrimental to surface shine.

U.S. Patent 5,082,584 discloses a microemulsion composition having an anionic surfactant, a cosurfactant, nonionic surfactant, perfume and water; however, these compositions are not light duty liquid compositions.

5 The present invention relates to novel microemulsion light duty liquid detergent compositions with high foaming properties, containing an alkyl polyglucoside surfactant, a sulfonate surfactant, a betaine and/or amine oxide surfactant, an ethoxylated alkyl ether sulfate surfactant, and optionally a cosurfactant, a solubilizing agent and/or an alkyl mono or dialkoxylated amide.

10 Nonionic surfactants are in general chemically inert and stable toward pH change and are therefore well suited for mixing and formulation with other materials. The superior performance of nonionic surfactants on the removal of oily soil is well recognized. Nonionic surfactants are also known to be mild to human skin. However, as a class, nonionic surfactants are known to be low or moderate foamers. Consequently, for detergents which require copious and stable foam, the application of
15 nonionic surfactants is limited. There have been substantial interest and efforts to develop a high foaming detergent with nonionic surfactants as the major active ingredient. Yet, little has been achieved.

The prior art is replete with light duty liquid detergent compositions containing nonionic surfactants in combination with anionic and/or betaine surfactants wherein the
20 nonionic detergent is not the major active surfactant, as shown in U.S. Patent No. 3,658,985 wherein an anionic based shampoo contains a minor amount of a fatty acid alkanolamide. U.S. Patent No. 3,769,398 discloses a betaine-based shampoo containing minor amounts of nonionic surfactants. This patent states that the low foaming properties of nonionic detergents renders its use in shampoo compositions
25 non-preferred. U.S. Patent No. 4,329,335 also discloses a shampoo containing a betaine surfactant as the major ingredient and minor amounts of a nonionic surfactant and of a fatty acid mono- or di-ethanolamide. U.S. Patent No. 4,259,204 discloses a shampoo comprising 0.8-20% by weight of an anionic phosphoric acid ester and one additional surfactant which may be either anionic, amphoteric, or nonionic. U.S. Patent

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MILD, RINSE-OFF ANTIMICROBIAL LIQUID CLEANSING COMPOSITIONS
CONTAINING ACIDIC SURFACTANTS

TECHNICAL FIELD

The present invention relates to mild, rinse-off, personal cleansing compositions which provide enhanced antimicrobial effectiveness. Specifically, the personal cleansing compositions of the invention provide previously unseen residual effectiveness against transient Gram negative bacteria, improved residual effectiveness against Gram positive bacteria and improved immediate germ reduction upon use.

BACKGROUND OF THE INVENTION

Human health is impacted by many microbial entities. Inoculation by viruses and bacteria cause a wide variety of sicknesses and ailments. Media attention to cases of food poisoning, strep infections, and the like is increasing public awareness of microbial issues.

It is well known that the washing of hard surfaces, food (e.g. fruit or vegetables) and skin, especially the hands, with antimicrobial or non-medicated soap, can remove many viruses and bacteria from the washed surfaces. Removal of the viruses and bacteria is due to the surfactancy of the soap and the mechanical action of the wash procedure. Therefore, it is known and recommended that the people wash frequently to reduce the spread of viruses and bacteria.

Bacteria found on the skin can be divided into two groups: resident and transient bacteria. Resident bacteria are Gram positive bacteria which are established as permanent microcolonies on the surface and outermost layers of the skin and play an important, helpful role in preventing the colonization of other, more harmful bacteria and fungi.

Transient bacteria are bacteria which are not part of the normal resident flora of the skin, but can be deposited when airborne contaminated material lands on the skin or when contaminated material is brought into physical contact with it. Transient bacteria are typically divided into two subclasses: Gram positive and Gram negative. Gram positive bacteria include pathogens such as *Staphylococcus aureus*, *Streptococcus pyogenes* and *Clostridium botulinum*. Gram negative bacteria include pathogens such as *Salmonella*, *Escherichia coli*, *Klebsiella*, *Haemophilus*, *Pseudomonas aeruginosa*, *Proteus* and *Shigella dysenteriae*. Gram negative bacteria are generally distinguished from Gram positive by an additional protective cell membrane which generally results in the Gram negative bacteria being less susceptible to topical antibacterial actives.

Antimicrobial cleansing products have been marketed in a variety of forms for some time. Forms include deodorant soaps, hard surface cleaners, and surgical disinfectants. These traditional rinse-off antimicrobial products have been formulated to provide bacteria removal

during washing. The antimicrobial soaps have also been shown to provide a residual effectiveness against Gram positive bacteria, but limited residual effectiveness versus Gram negative bacteria. By residual effectiveness it is meant that bacteria growth on a surface is controlled for some period of time following the washing/rinsing process. For example, antibacterial soap, when used regularly in hand washing, has been found to provide a 1.0 log to 1.5 log reduction (i.e 90 to 97% reduction) residual effectiveness against Gram positive bacteria after two to five hours. That is skin washed with antibacterial soap, was tested two to five hours later, to be contaminated with only from 3 to 10% of the number of Gram positive bacteria compared to skin washed with a placebo soap, depending on the test protocol and bacteria tested. Also, Dial or Safeguard liquid soaps, when used in hand washing, have been found to reduce the amount of the bacteria on the skin by from about 1.5 log (97%) to about 2.5 log (99.7%) as measured by standard Health Care Personal Handwash Tests (HCPHWT). That is skin washed with these soaps were contaminated with only 0.3%-3% of the number of bacteria compared to before washing. Antimicrobial liquid cleansers are disclosed in U.S. Patent Numbers: 4,847,072, Bissett et al., issued July 11, 1989, 4,939,284, Degenhardt, issued July 3, 1990 and 4,820,698, Degenhardt, issued April 11, 1989, all of which are incorporated herein by reference.

Previously marketed formulations of Head & Shoulders® Dandruff Shampoo, marketed until 1994, comprised anionic surfactants, an antibacterial active and citric acid as a pH adjuster. Head & Shoulders® controlled *Pityrosorum ovale* fungus, which causes dandruff. PCT application WO 92/18100, Keegan et al., published October 29, 1992 ("Keegan") and PCT application WO 95/32705, Fujiwara et al., published December 7, 1995 ("Fujiwara") teach liquid skin cleansers comprising mild surfactants, antibacterial agents and acidic compounds to buffer the pH, which provide improved germ hostility. However, the use of the low levels of acid compounds therein, result in compositions which do not deliver the undissociated acid required to provide the improved antimicrobial benefits. This situation is compounded in Keegan and Fujiwara by the preference of mild surfactants, including nonionic surfactants.

Some of these antimicrobial products, especially the hard surface cleaners and surgical disinfectants, utilize high levels of alcohol and/or surfactants which have been shown to dry out and irritate skin tissues. Ideal personal cleansers should gently cleanse the skin, cause little or no irritation, and not leave the skin or hair overly dry after frequent use and preferably should provide a moisturizing benefit to the skin.

U.S. Patent Number 3,141,821, issued to Compeau July 21, 1964 and Irgasan DP 300 (Triclosan®) technical literature from Ciba-Giegy, Inc., "Basic Formulation for Hand Disinfection 89/42/01" set forth antibacterial skin cleansers compositions which could provide improved antimicrobial efficacy using certain anionic surfactants, antimicrobial actives and

acids. However, the selection, therein, of highly active surfactants results in personal cleansing compositions which are drying and harsh to the skin.

Given the severe health impacts of Gram negative bacteria like *Salmonella*, *Escherichia coli* and *Shigella*, it would be highly desirable to formulate antimicrobial cleansing compositions which provide residual effectiveness versus these Gram negative bacteria, residual effectiveness versus Gram positive bacteria and improved germ reduction, and which are mild to the skin. Existing consumer products have been unable to achieve both Gram negative residual effectiveness and mildness.

Applicants have found that rinse-off antimicrobial cleansing compositions which provide such mildness and such antimicrobial effectiveness can be formulated by using known antimicrobial actives in combination with specific organic and/or inorganic acids, as proton donating agents, and specific anionic surfactants, especially a class of acidic surfactants, all of which are deposited on the skin. The deposited proton donating agent and anionic surfactant enhance the selected active, to provide a new level of hostility to bacteria contacting the skin. Use of the class of acidic surfactants has been found to give an unexpectedly high level of antimicrobial efficacy with very little impact on the mildness of the composition.

SUMMARY OF THE INVENTION

The present invention relates to a rinse-off antimicrobial cleansing composition comprising from about 0.1% to about 5.0%, by weight of the cleansing composition, of an antimicrobial active; from about 4% to about 18%, by weight of the cleansing composition, of an anionic surfactant, wherein at least about 67% of the anionic surfactant is selected from the group consisting of Class A surfactants, Class C surfactants, and mixtures thereof, wherein the ratio of Class A surfactant to Class C is from about 100:0 to about 1.5:1; from about 0.1% to about 10%, by weight of the cleansing composition, of a Class D acidic surfactants; from about 69.4% to about 84.9%, by weight of the cleansing composition, of water; wherein the composition is adjusted to a pH of greater than about 3.0 and less than about 5.5.

The present invention also relates to methods for cleansing, reducing germs and decreasing the spread of transient Gram negative and Gram positive bacteria using the rinse-off antimicrobial cleansing compositions described herein.

DETAILED DESCRIPTION OF THE INVENTION

The rinse-off antimicrobial cleansing compositions of the present invention are highly efficacious for cleansing surfaces, especially the skin, provide a residual antimicrobial effectiveness versus transient Gram negative bacteria, provide a residual antimicrobial effectiveness versus Gram positive, reducing the number of germs on the skin, and are mild to the skin.

The term "rinse-off" is used herein to mean that the compositions of the present invention are used in a context whereby the composition is ultimately rinsed or washed from the treated surface, (e.g. skin or hard surfaces) either after or during the application of the product.

The term "antimicrobial cleansing composition" as used herein means a composition suitable for application to a surface for the purpose of removing dirt, oil and the like which additionally controls the growth and viability of transient Gram negative and Gram positive bacteria. Preferred embodiments of the present invention are cleansing compositions suitable for use on the human skin.

The compositions of the present invention can also be useful for treatment of acne. As used herein "treating acne" means preventing, retarding and/or arresting the process of acne formation in mammalian skin.

The compositions of the invention can also be useful for providing an essentially immediate (i.e., acute) visual improvement in skin appearance following application of the composition to the skin. More particularly, the compositions of the present invention are useful for regulating skin condition, including regulating visible and/or tactile discontinuities in skin, including but not limited to visible and/or tactile discontinuities in skin texture and/or color, more especially discontinuities associated with skin aging. Such discontinuities may be induced or caused by internal and/or external factors. Extrinsic factors include ultraviolet radiation (e.g., from sun exposure), environmental pollution, wind, heat, low humidity, harsh surfactants, abrasives, and the like. Intrinsic factors include chronological aging and other biochemical changes from within the skin.

Regulating skin condition includes prophylactically and/or therapeutically regulating skin condition. As used herein, prophylactically regulating skin condition includes delaying, minimizing and/or preventing visible and/or tactile discontinuities in skin. As used herein, therapeutically regulating skin condition includes ameliorating, e.g., diminishing, minimizing and/or effacing, such discontinuities. Regulating skin condition involves improving skin appearance and/or feel, e.g., providing a smoother, more even appearance and/or feel. As used herein, regulating skin condition includes regulating signs of aging. "Regulating signs of skin aging" includes prophylactically regulating and/or therapeutically regulating one or more of such signs (similarly, regulating a given sign of skin aging, e.g., lines, wrinkles or pores, includes prophylactically regulating and/or therapeutically regulating that sign).

"Signs of skin aging" include, but are not limited to, all outward visibly and tactilely perceptible manifestations as well as any other macro or micro effects due to skin aging. Such signs may be induced or caused by intrinsic factors or extrinsic factors, e.g., chronological aging and/or environmental damage. These signs may result from processes which include, but are not limited to, the development of textural discontinuities such as wrinkles, including both fine

superficial wrinkles and coarse deep wrinkles, skin lines, crevices, bumps, large pores (e.g., associated with adnexal structures such as sweat gland ducts, sebaceous glands, or hair follicles), scaliness, flakiness and/or other forms of skin unevenness or roughness, loss of skin elasticity (loss and/or inactivation of functional skin elastin), sagging (including puffiness in the eye area and jowls), loss of skin firmness, loss of skin tightness, loss of skin recoil from deformation, discoloration (including undereye circles), blotching, sallowness, hyperpigmented skin regions such as age spots and freckles, keratoses, abnormal differentiation, hyperkeratinization, elastosis, collagen breakdown, and other histological changes in the stratum corneum, dermis, epidermis, the skin vascular system (e.g., telangiectasia or spider vessels), and underlying tissues, especially those proximate to the skin.

All percentages and ratios used herein, unless otherwise indicated, are by weight and all measurements made are at 25°C, unless otherwise designated. The invention hereof can comprise, consist of, or consist essentially of, the essential as well as optional ingredients and components described therein.

I. INGREDIENTS

The rinse-off antimicrobial cleansing compositions of the present invention comprise an antimicrobial active, an anionic surfactant, a proton donating agent, and water. These components are selected so that the efficacy and mildness requirements hereinafter defined for the compositions herein are met. The selection of each component is necessarily dependent on the selection of each of the other components. For example, if a weak acid is selected as the proton donating agent, then in order to realize an efficacious composition, either a more biologically active (but possibly less mild) surfactant must be employed, and/or a high level of acid within the prescribed range must be used and/or a particularly efficacious active must be employed and/or a higher level of deposition within the prescribed range must be employed. Similarly, if a mild, but nonefficacious surfactant is employed, then a stronger acid and/or a high level of acid and/or a high level of deposition aid may be necessary to realize an efficacious composition. If a harsh surfactant is utilized, then a mildness agent may have to be utilized or a lipophilic skin moisturizer ingredient may have to be employed as the deposition aid. Each of these ingredients is described in detail as follows. Tables 1 and 2 summarize the formulation preferences which are required to achieve this balance.

A. ANTIMICROBIAL ACTIVE

The rinse-off antimicrobial cleansing compositions of the present invention comprise from about 0.1% to about 5.0%, preferably from about 0.1% to about 2%, more preferably from about 0.1% to about 1.0% of an antimicrobial active. Non-cationic actives are required in order to avoid interaction with the anionic surfactants of the invention.

Given below are examples of non-cationic antimicrobial agents which are useful in the present invention .

Pyrithiones, especially the zinc complex (ZPT)
Octopirox®
Dimethyldimethylol Hydantoin (Glydant®)
Methylchloroisothiazolinone/methylisothiazolinone (Kathon CG®)
Sodium Sulfite
Sodium Bisulfite
Imidazolidinyl Urea (Germall 115®)
Diazolidinyl Urea (Germaill II®)
Benzyl Alcohol
2-Bromo-2-nitropropane-1,3-diol (Bronopol®)
Formalin (formaldehyde)
Iodopropenyl Butylcarbamate (Polyphase P100®)
Chloroacetamide
Methanamine
Methyldibromonitrile Glutaronitrile (1,2-Dibromo-2,4-dicyanobutane or Tektamer®)
Glutaraldehyde
5-bromo-5-nitro-1,3-dioxane (Bronidox®)
Phenethyl Alcohol
o-Phenylphenol/sodium o-phenylphenol
Sodium Hydroxymethylglycinate (Suttocide A®)
Polymethoxy Bicyclic Oxazolidine (Nuosept C®)
Dimethoxane
Thimersal
Dichlorobenzyl Alcohol
Captan
Chlorphenenesin
Dichlorophene
Chlorbutanol
Glyceryl Laurate
Halogenated Diphenyl Ethers
2,4,4'-trichloro-2'-hydroxy-diphenyl ether (Triclosan® or TCS)
2,2'-dihydroxy-5,5'-dibromo-diphenyl ether
Phenolic Compounds
Phenol
2-Methyl Phenol
3-Methyl Phenol
4-Methyl Phenol
4-Ethyl Phenol
2,4-Dimethyl Phenol
2,5-Dimethyl Phenol
3,4-Dimethyl Phenol
2,6-Dimethyl Phenol
4-n-Propyl Phenol
4-n-Butyl Phenol
4-n-Amyl Phenol
4-tert-Amyl Phenol
4-n-Hexyl Phenol

4-n-Heptyl Phenol

Mono- and Poly-Alkyl and Aromatic Halophenols

p-Chlorophenol

Methyl p-Chlorophenol

Ethyl p-Chlorophenol

n-Propyl p-Chlorophenol

n-Butyl p-Chlorophenol

n-Amyl p-Chlorophenol

sec-Amyl p-Chlorophenol

n-Hexyl p-Chlorophenol

Cyclohexyl p-Chlorophenol

n-Heptyl p-Chlorophenol

n-Octyl p-Chlorophenol

o-Chlorophenol

Methyl o-Chlorophenol

Ethyl o-Chlorophenol

n-Propyl o-Chlorophenol

n-Butyl o-Chlorophenol

n-Amyl o-Chlorophenol

tert-Amyl o-Chlorophenol

n-Hexyl o-Chlorophenol

n-Heptyl o-Chlorophenol

o-Benzyl p-Chlorophenol

o-Benzyl-m-methyl p-Chlorophenol

o-Benzyl-m, m-dimethyl p-Chlorophenol

o-Phenylethyl p-Chlorophenol

o-Phenylethyl-m-methyl p-Chlorophenol

3-Methyl p-Chlorophenol

3,5-Dimethyl p-Chlorophenol

6-Ethyl-3-methyl p-Chlorophenol

6-n-Propyl-3-methyl p-Chlorophenol

6-iso-Propyl-3-methyl p-Chlorophenol

2-Ethyl-3,5-dimethyl p-Chlorophenol

6-sec-Butyl-3-methyl p-Chlorophenol

2-iso-Propyl-3,5-dimethyl p-Chlorophenol

6-Diethylmethyl-3-methyl p-Chlorophenol

6-iso-Propyl-2-ethyl-3-methyl p-Chlorophenol

2-sec-Amyl-3,5-dimethyl p-Chlorophenol

2-Diethylmethyl-3,5-dimethyl p-Chlorophenol

6-sec-Octyl-3-methyl p-Chlorophenol

p-Chloro-m-cresol

p-Bromophenol

Methyl p-Bromophenol

Ethyl p-Bromophenol

n-Propyl p-Bromophenol

n-Butyl p-Bromophenol

n-Amyl p-Bromophenol

sec-Amyl p-Bromophenol

n-Hexyl p-Bromophenol

Cyclohexyl p-Bromophenol

o-Bromophenol
tert-Amyl o-Bromophenol
n-Hexyl o-Bromophenol
n-Propyl-m,m-Dimethyl o-Bromophenol
2-Phenyl Phenol
4-Chloro-2-methyl phenol
4-Chloro-3-methyl phenol
4-Chloro-3,5-dimethyl phenol
2,4-Dichloro-3,5-dimethylphenol
3,4,5,6-Terabromo-2-methylphenol
5-Methyl-2-pentylphenol
4-Isopropyl-3-methylphenol
Para-chloro-meta-xyleneol (PCMX)
Chlorothymol
Phenoxyethanol
Phenoxyisopropanol
5-Chloro-2-hydroxydiphenylmethane

Resorcinol and its Derivatives

Resorcinol
Methyl Resorcinol
Ethyl Resorcinol
n-Propyl Resorcinol
n-Butyl Resorcinol
n-Amyl Resorcinol
n-Hexyl Resorcinol
n-Heptyl Resorcinol
n-Octyl Resorcinol
n-Nonyl Resorcinol
Phenyl Resorcinol
Benzyl Resorcinol
Phenylethyl Resorcinol
Phenylpropyl Resorcinol
p-Chlorobenzyl Resorcinol
5-Chloro 2,4-Dihydroxydiphenyl Methane
4'-Chloro 2,4-Dihydroxydiphenyl Methane
5-Bromo 2,4-Dihydroxydiphenyl Methane
4' -Bromo 2,4-Dihydroxydiphenyl Methane

Bisphenolic Compounds

2,2'-Methylene bis (4-chlorophenol)
2,2'-Methylene bis (3,4,6-trichlorophenol)
2,2'-Methylene bis (4-chloro-6-bromophenol)
bis (2-hydroxy-3,5-dichlorophenyl) sulphide
bis (2-hydroxy-5-chlorobenzyl)sulphide

Benzoic Esters (Parabens)

Methylparaben
Propylparaben
Butylparaben
Ethylparaben
Isopropylparaben
Isobutylparaben

Benzylparaben
Sodium Methylparaben
Sodium Propylparaben
Halogenated Carbanilides
3,4,4'-Trichlorocarbanilides (Trichlocarban® or TCC)
3-Trifluoromethyl-4,4'-dichlorocarbanilide
3,3',4'-Trichlorocarbanilide

Another class of antibacterial agents, which are useful in the present invention, are the so-called "natural" antibacterial actives, referred to as natural essential oils. These actives derive their names from their natural occurrence in plants. Typical natural essential oil antibacterial actives include oils of anise, lemon, orange, rosemary, wintergreen, thyme, lavender, cloves, hops, tea tree, citronella, wheat, barley, lemongrass, cedar leaf, cedarwood, cinnamon, fleagrass, geranium, sandalwood, violet, cranberry, eucalyptus, vervain, peppermint, gum benzoin, basil, fennel, fir, balsam, menthol, ocmeca origanum, *Hydastis carradensis*, *Berberidaceae daceae*, *Ratanhia* and *Curcuma longa*. Also included in this class of natural essential oils are the key chemical components of the plant oils which have been found to provide the antimicrobial benefit. These chemicals include, but are not limited to anethol, catechole, camphene, thymol, eugenol, eucalyptol, ferulic acid, farnesol, hinokitiol, tropolone, limonene, menthol, methyl salicylate, carvacol, terpineol, verbenone, berberine, ratanhia extract, caryophellene oxide, citronellic acid, curcumin, nerolidol and geraniol.

Additional active agents are antibacterial metal salts. This class generally includes salts of metals in groups 3b-7b, 8 and 3a-5a. Specifically are the salts of aluminum, zirconium, zinc, silver, gold, copper, lanthanum, tin, mercury, bismuth, selenium, strontium, scandium, yttrium, cerium, praseodymium, neodymium, promethum, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium and mixtures thereof.

Preferred antimicrobial agents for use herein are the broad spectrum actives selected from the group consisting of Triclosan®, Triclocarban®, Octopirox®, PCMX, ZPT, natural essential oils and their key ingredients, and mixtures thereof. The most preferred antimicrobial active for use in the present invention is Triclosan®.

B. ANIONIC SURFACTANT

The rinse-off antimicrobial cleansing compositions of the present invention comprise from about 4% to about 18%. Without being limited by theory, it is believed that the anionic surfactant disrupts the lipid in the cell membrane of the bacteria. The particular acid used herein reduces the negative charges on the cell wall of the bacteria, crosses through the cell membrane, weakened by the surfactant, and acidifies the cytoplasm of the bacteria. The antimicrobial active can then pass more easily through the weakened cell wall, and more efficiently poison the bacteria.

Nonlimiting examples of anionic lathering surfactants useful in the compositions of the present invention are disclosed in McCutcheon's, Detergents and Emulsifiers, North American edition (1990), published by The Manufacturing Confectioner Publishing Co.; McCutcheon's, Functional Materials, North American Edition (1992); and U.S. Patent No. 3,929,678, to Laughlin et al., issued December 30, 1975, all of which are incorporated by reference.

A wide variety of anionic surfactants are potentially useful herein. Nonlimiting examples of anionic lathering surfactants include those selected from the group consisting of alkyl and alkyl ether sulfates, sulfated monoglycerides, sulfonated olefins, alkyl aryl sulfonates, primary or secondary alkane sulfonates, alkyl sulfosuccinates, acyl taurates, acyl isethionates, alkyl glyceryl ether sulfonate, sulfonated methyl esters, sulfonated fatty acids, alkyl phosphates, acyl glutamates, acyl sarcosinates, alkyl sulfoacetates, acylated peptides, alkyl ether carboxylates, acyl lactylates, anionic fluorosurfactants, and mixtures thereof. Mixtures of anionic surfactants can be used effectively in the present invention.

Anionic surfactants for use in the cleansing compositions include alkyl and alkyl ether sulfates. These materials have the respective formulae R^1O-SO_3M and $R^1(CH_2H_4O)_x-O-SO_3M$, wherein R^1 is a saturated or unsaturated, branched or unbranched alkyl group from about 8 to about 24 carbon atoms, x is 1 to 10, and M is a water-soluble cation such as ammonium, sodium, potassium, magnesium, triethanolamine, diethanolamine and monoethanolamine. The alkyl sulfates are typically made by the sulfation of monohydric alcohols (having from about 8 to about 24 carbon atoms) using sulfur trioxide or other known sulfation technique. The alkyl ether sulfates are typically made as condensation products of ethylene oxide and monohydric alcohols (having from about 8 to about 24 carbon atoms) and then sulfated. These alcohols can be derived from fats, e.g., coconut oil or tallow, or can be synthetic. Specific examples of alkyl sulfates which may be used in the cleanser compositions are sodium, ammonium, potassium, magnesium, or TEA salts of lauryl or myristyl sulfate. Examples of alkyl ether sulfates which may be used include ammonium, sodium, magnesium, or TEA laureth-3 sulfate.

Another suitable class of anionic surfactants are the sulfated monoglycerides of the form $R^1CO-O-CH_2-C(OH)H-CH_2-O-SO_3M$, wherein R^1 is a saturated or unsaturated, branched or unbranched alkyl group from about 8 to about 24 carbon atoms, and M is a water-soluble cation such as ammonium, sodium, potassium, magnesium, triethanolamine, diethanolamine and monoethanolamine. These are typically made by the reaction of glycerin with fatty acids (having from about 8 to about 24 carbon atoms) to form a monoglyceride and the subsequent sulfation of this monoglyceride with sulfur trioxide. An example of a sulfated monoglyceride is sodium cocomonoglyceride sulfate.

Other suitable anionic surfactants include olefin sulfonates of the form R^1SO_3M , wherein R^1 is a mono-olefin having from about 12 to about 24 carbon atoms, and M is a water-soluble cation such as ammonium, sodium, potassium, magnesium, triethanolamine, diethanolamine and monoethanolamine. These compounds can be produced by the sulfonation of alpha olefins by means of uncomplexed sulfur trioxide, followed by neutralization of the acid reaction mixture in conditions such that any sultones which have been formed in the reaction are hydrolyzed to give the corresponding hydroxyalkanesulfonate. An example of a sulfonated olefin is sodium C_{14}/C_{16} alpha olefin sulfonate.

Other suitable anionic surfactants are the linear alkylbenzene sulfonates of the form $R^1-C_6H_4-SO_3M$, wherein R^1 is a saturated or unsaturated, branched or unbranched alkyl group from about 8 to about 24 carbon atoms, and M is a water-soluble cation such as ammonium, sodium, potassium, magnesium, triethanolamine, diethanolamine and monoethanolamine. These are formed by the sulfonation of linear alkyl benzene with sulfur trioxide. An example of this anionic surfactant is sodium dodecylbenzene sulfonate.

Still other anionic surfactants suitable for this cleansing composition include the primary or secondary alkane sulfonates of the form R^1SO_3M , wherein R^1 is a saturated or unsaturated, branched or unbranched alkyl chain from about 8 to about 24 carbon atoms, and M is a water-soluble cation such as ammonium, sodium, potassium, magnesium, triethanolamine, diethanolamine and monoethanolamine. These are commonly formed by the sulfonation of paraffins using sulfur dioxide in the presence of chlorine and ultraviolet light or another known sulfonation method. The sulfonation can occur in either the secondary or primary positions of the alkyl chain. An example of an alkane sulfonate useful herein is alkali metal or ammonium $C_{13}-C_{17}$ paraffin sulfonates.

Still other suitable anionic surfactants are the alkyl sulfosuccinates, which include disodium N-octadecylsulfosuccinamate; diammonium lauryl sulfosuccinate; tetrasodium N-(1,2-dicarboxyethyl)-N-octadecylsulfosuccinate; diamyl ester of sodium sulfosuccinic acid; dihexyl ester of sodium sulfosuccinic acid; and dioctyl esters of sodium sulfosuccinic acid.

Also useful are taurates which are based on taurine, which is also known as 2-aminoethanesulfonic acid. Examples of taurates include N-alkyltaurines such as the one prepared by reacting dodecylamine with sodium isethionate according to the teaching of U.S. Patent 2,658,072 which is incorporated herein by reference in its entirety. Other examples based of taurine include the acyl taurines formed by the reaction of n-methyl taurine with fatty acids (having from about 8 to about 24 carbon atoms).

Another class of anionic surfactants suitable for use in the cleansing composition are the acyl isethionates. The acyl isethionates typically have the formula $R^1CO-O-CH_2CH_2SO_3M$ wherein R^1 is a saturated or unsaturated, branched or unbranched alkyl group having from

about 10 to about 30 carbon atoms, and M is a cation. These are typically formed by the reaction of fatty acids (having from about 8 to about 30 carbon atoms) with an alkali metal isethionate. Nonlimiting examples of these acyl isethionates include ammonium cocoyl isethionate, sodium cocoyl isethionate, sodium lauroyl isethionate, and mixtures thereof.

Still other suitable anionic surfactants are the alkylglyceryl ether sulfonates of the form $R^1-OCH_2-C(OH)H-CH_2-SO_3M$, wherein R^1 is a saturated or unsaturated, branched or unbranched alkyl group from about 8 to about 24 carbon atoms, and M is a water-soluble cation such as ammonium, sodium, potassium, magnesium, triethanolamine, diethanolamine and monoethanolamine. These can be formed by the reaction of epichlorohydrin and sodium bisulfite with fatty alcohols (having from about 8 to about 24 carbon atoms) or other known methods. One example is sodium cocoglyceryl ether sulfonate.

Other suitable anionic surfactants include the sulfonated fatty acids of the form $R^1-CH(SO_3^-)-COOH$ and sulfonated methyl esters of the form $R^1-CH(SO_3^-)-CO-O-CH_3$, where R^1 is a saturated or unsaturated, branched or unbranched alkyl group from about 8 to about 24 carbon atoms. These can be formed by the sulfonation of fatty acids or alkyl methyl esters (having from about 8 to about 24 carbon atoms) with sulfur trioxide or by another known sulfonation technique. Examples include alpha sulphonated coconut fatty acid and lauryl methyl ester.

Other anionic materials include phosphates such as monoalkyl, dialkyl, and trialkylphosphate salts formed by the reaction of phosphorous pentoxide with monohydric branched or unbranched alcohols having from about 8 to about 24 carbon atoms. These could also be formed by other known phosphorylation methods. An example from this class of surfactants is sodium mono or dilaurylphosphate.

Other anionic materials include acyl glutamates corresponding to the formula $R^1CO-NH(CH_2CH_2-CO_2M)$ wherein R^1 is a saturated or unsaturated, branched or unbranched alkyl or alkenyl group of about 8 to about 24 carbon atoms, and M is a water-soluble cation. Nonlimiting examples of which include sodium lauroyl glutamate and sodium cocoyl glutamate.

Other anionic materials include alkanoyl sarcosinates corresponding to the formula $R^1CON(CH_3)-CH_2CH_2-CO_2M$ wherein R^1 is a saturated or unsaturated, branched or unbranched alkyl or alkenyl group of about 10 to about 20 carbon atoms, and M is a water-soluble cation. Nonlimiting examples of which include sodium lauroyl sarcosinate, sodium cocoyl sarcosinate, and ammonium lauroyl sarcosinate.

Other anionic materials include alkyl ether carboxylates corresponding to the formula $R^1-(OCH_2CH_2)_x-OCH_2-CO_2M$ wherein R^1 is a saturated or unsaturated, branched or unbranched alkyl or alkenyl group of about 8 to about 24 carbon atoms, x is 1 to 10, and M is a water-soluble cation. Nonlimiting examples of which include sodium laureth carboxylate.

Other anionic materials include acyl lactylates corresponding to the formula $R^1CO-[O-CH(CH_3)-CO]_x-CO_2M$ wherein R^1 is a saturated or unsaturated, branched or unbranched alkyl or alkenyl group of about 8 to about 24 carbon atoms, x is 3, and M is a water-soluble cation. Nonlimiting examples of which include sodium cocoyl lactylate.

Other anionic materials include the carboxylates, nonlimiting examples of which include sodium lauroyl carboxylate, sodium cocoyl carboxylate, and ammonium lauroyl carboxylate. Anionic fluorosurfactants can also be used.

Any counter cation, M , can be used on the anionic surfactant. Preferably the counter cation is selected from the group consisting of sodium, potassium, ammonium, monoethanolamine, diethanolamine, and triethanolamine. Ammonium has been found to provide higher levels of antimicrobial efficacy. However, it has been found to be less mild than other cations. Therefore, in some embodiments, levels of surfactant and proton donating agent must be adjusted accordingly. This is outlined in Table 1.

The anionic surfactants primarily employed in the compositions of the present invention can be grouped into four classes based on their mildness and antimicrobial efficacy. The four classes of anionic surfactants are defined below.

Class A - The first class of anionic surfactants are those which are considered to be mild, but minimally enhance antimicrobial efficacy. These includes the group consisting of alkyl ether sulfates; acyl monoglyceryl sulfates; alkyl glycerylether sulfonates; acyl isethionates; acyl taurates; alkyl sulfosuccinates; alkyl sulfoacetates; sulfonated olefins; alkyl sulfates which have a predominant chain length of C8, C10, C16 or C18; and mixtures thereof.

Class B - The second class of surfactants are those which are considered to be mild, but enhance antimicrobial efficacy. These includes the group consisting of primary or secondary alkane sulfonates, alkyl sulfates which have a predominant chain length of C14, and mixtures thereof.

Class C - The third class of anionic surfactants are those which are considered to be harsh, but which greatly enhance antimicrobial efficacy. These include the group consisting of alkyl aryl sulfonates, alkyl sulfocarboxylates, sulfonated fatty acids, alkyl phosphates, alkyl sulfates which have a predominant chain length of C12, and mixtures thereof. Specific examples of harsh surfactants are lauryl sulfate, lauryl benzene sulfonate, monolauryl phosphate, and lauryl sulfocarboxylate.

Class D - Acidic Surfactants - The fourth class of preferred anionic surfactants consist of surfactants which have a pK_a of greater than 4.0. These acidic surfactants include the group consisting of acyl sarcosinates, acyl glutamates, alkyl ether carboxylates and mixtures thereof. Acidic surfactants have been found to be a more efficacious surfactant. Without being limited by theory, it is believed that these surfactants provide both the acid and anionic surfactant

benefit in one component. Rinse-off antimicrobial compositions comprising these acidic surfactants provide better antimicrobial efficacy than other surfactants. Their acidic property also allows to the use of less separate proton donating agent, which even further improves the mildness of the antimicrobial cleansing compositions herein. The Class D acidic surfactants are used in the cleansing compositions herein at levels from about 0.1% to about 10%, preferably from about 0.5% to about 10%, more preferably from about 1.0% to about 10%, even more preferably from about 2% to about 10%, and most preferably from about 5% to about 10%.

It is beneficial to formulate compositions based on predominant mixtures of two of these classes at a time which comprise at least about 67%, preferably at least about 80%, more preferably about 90% of the anionic surfactant present in the liquid antimicrobial compositions herein. Different ratios of surfactants in the different classes, result in required formulary adjustments. These are all summarized in Tables 1 and 2.

Nonlimiting examples of preferred anionic surfactants useful herein include those selected from the group consisting of sodium and ammonium alkyl sulfates and ether sulfates having chain lengths of predominantly 12 and 14 carbon atoms, olefin sulfates having chain lengths of predominantly 14 and 16 carbon atoms, and paraffin sulfonates having chain lengths of from 13 to 17 carbon atoms, and mixtures thereof. Especially preferred for use herein is ammonium and sodium lauryl sulfate; ammonium and sodium myristyl sulfate; ammonium and sodium laureth-1, laureth-2, laureth-3, and laureth-4 sulfate; ammonium and sodium, C14-C16 olefin sulfonates; C13-C17 paraffin sulfonates, and mixtures thereof.

Non-anionic surfactants of the group consisting of nonionic surfactants, cationic surfactants, amphoteric surfactants and mixtures thereof, have been found to actually reduce residual effectiveness benefits when used with anionic surfactants at high levels. This is most evident in the case of cationic and amphoteric surfactants where it is believed that these surfactants interfere (charge-charge interaction) with the anionic surfactant's ability to disrupt of the lipid in the cell membrane. The ratio of the amount of these other surfactants to the amount of anionic surfactant should be less than 1:1, and preferably less than 1:2.

The rinse-off antimicrobial cleansing compositions of the present invention preferably do not comprise hydrotropic sulfonates, particularly salts of terpenoids, or mono- or binuclear aromatic compounds such as sulfonates of camphor, toluene, xylene, cumene and naphthene.

C. WATER

Liquid rinse-off antimicrobial cleansing compositions of the present invention comprise from about 35% to about 98.899%, preferably from about 45% to about 98%, more preferably from about 55% to about 97.5%, and most preferably from about 65% to about 95.99% water. Solid bar embodiments of the present invention preferably comprise from about 2% to about

25%, more preferably from about 3% to about 20% and most preferably from about 5% to about 15% water.

Liquid rinse-off antimicrobial cleansing compositions of the present invention, preferably have an apparent or neat viscosity of from about 500 cps to about 60,000 cps at 26.7°C, preferably 5,000 to 30,000 cps. The term "viscosity" as used herein means the viscosity as measured by a Brookfield RVTDCP with a spindle CP-41 at 1 RPM for 3 minutes, unless otherwise specified. The "neat" viscosity is the viscosity of the undiluted liquid cleanser.

D. pH

It is critical to achieving the benefits of the invention that the undissociated acid from the proton donating agent (deposited or formed *in-situ*) remain on the skin in the protonated form. Therefore, the pH of the rinse-off antimicrobial cleansing compositions of the present invention must be adjusted to a sufficiently low level in order to either form or deposit substantial undissociated acid on the skin. The pH of the compositions should be adjusted and preferably buffered to have a range of from about 3.0 to about 5.5, preferably from about 3.5 to about 5.0 and more preferably from about 3.5 to about 4.5.

E. PREFERRED OPTIONAL INGREDIENTS

Proton Donating Agent

The rinse-off antimicrobial cleansing compositions utilizing acidic surfactants can optionally comprise up to about 8%, based on the weight of the personal cleansing composition, of a proton donating agent. Preferable levels of proton donating agent are detailed in Tables 1 and 2. By "proton donating agent" it is meant any acid compound or mixture thereof, which results in the presence of undissociated acid on the skin after use. Proton donating agents can be organic acids, including polymeric acids, mineral acids or mixtures thereof.

Organic Acids

Proton donating agents which are organic acids remain at least partially undissociated in the neat composition and remain so when the compositions are diluted during washing and rinsing. The organic acid proton donating agent must have at least one pKa value below 5.5. These organic proton donating agents can be added directly to the composition in the acid form or can be formed by adding the conjugate base of the desired acid and a sufficient amount of a separate acid strong enough to form the undissociated acid from the base.

Biological Activity Index of Organic Acids

Preferred organic proton donating agents are selected based on their biological activity. This activity is represented by a Biological Activity Index, Z, which is defined as:

$$Z = 1 + 0.25pK_{a1} + 0.42\log P.$$

The biological activity index combines the dissociation characteristics and the hydrophobicity of the acid. It is critical that the undissociated proton donating agent of the

composition be deposited on the skin to reduce the negative charge on the cell wall. The acid's dissociation constant, pK_{a1} , is indicative of the chemical's proton donating capacity relative to the pH of the medium in which it is incorporated. Since more undissociated acid is preferable in the composition, acids with higher pK_a 's are generally more preferred for a given product pH. The octanol-water partition coefficient, P , represents the tendency of materials in solution to prefer either oils or water. It essentially is a measure of hydrophobic nature of a material in solution: the higher the partition coefficient, the more oil soluble, and less water soluble, the material. Since it is desired that the dissolved acids in the compositions come out of the aqueous cleanser upon application, deposit on the oil-based skin and remain during rinsing, organic acids with higher octanol-water partition coefficients are more preferred.

Preferred organic proton donating agents of the rinse-off antimicrobial cleansing compositions of the present invention have a biological activity index greater than about 0.75, preferably greater than about 1.0, more preferably greater than about 1.5 and most preferably greater than 2.0.

Mineral Acids

Proton donating agents which are mineral acids will not remain undissociated in the neat composition or when the compositions are diluted during washing and rinsing. Despite this, it has been found that mineral acids can be effective proton donating agents for use herein. Without being limited by theory, it is believed that the strong mineral acids, protonate the carboxylic and phosphatidyl groups in proteins of the skin cells, thereby providing *in-situ* undissociated acid. These proton donating agents can only be added directly to the composition in the acid form.

A non-exclusive list of examples of organic acids which can be used as the proton donating agent are adipic acid, tartaric acid, citric acid, maleic acid, malic acid, succinic acid, glycolic acid, glutaric acid, benzoic acid, malonic acid, salicylic acid, gluconic acid, polyacrylic acid, their salts, and mixtures thereof. A non-exclusive list of examples of mineral acid for use herein are hydrochloric, phosphoric, sulfuric and mixtures thereof.

Mildness Enhancing Agents

In order to achieve the mildness required of the present invention, optional ingredients to enhance the mildness to the skin can be added. These ingredients include cationic and nonionic polymers, cosurfactants, moisturizers and mixtures thereof. Polymers useful herein include polyethylene glycols, polypropylene glycols, hydrolyzed silk proteins, hydrolyzed milk proteins, hydrolyzed keratin proteins, guar hydroxypropyltrimonium chloride, polyquats, silicone polymers and mixtures thereof. When used, the mildness enhancing polymers comprise from about 0.1% to about 1%, preferably from about 0.2% to about 1.0%, and more preferably from about 0.2% to about 0.6%, by weight of the rinse-off antimicrobial cleansing composition, of the

composition. Cosurfactants useful herein include nonionic surfactants such as the Genapol® 24 series of ethoxylated alcohols, POE(20) sorbitan monooleate (Tween® 80), polyethylene glycol cocoate and Pluronic® propylene oxide/ethylene oxide block polymers, and amphoteric surfactants such as alkyl betaines, alkyl sultaines, alkyl amphotacetates, alkyl amphodiacetates, alkyl amphopropionates, and alkyl amphodipropionates. When used, the mildness enhancing cosurfactants comprise from about 20% to about 70%, preferably from about 20% to about 50%, by weight of the anionic surfactant, of the cleansing composition. Preferred mildness enhancing agents are selected from the group of from about 20% to about 70%, by weight of the anionic surfactant, of the mildness enhancing cosurfactant, from about 0.1% to about 1.0%, by weight of the antimicrobial cleansing composition, of the mildness enhancing polymer, and mixtures thereof.

F. OTHER OPTIONAL INGREDIENTS

The compositions of the present invention can comprise a wide range of optional ingredients. The CTFA International Cosmetic Ingredient Dictionary, Sixth Edition, 1995, which is incorporated by reference herein in its entirety, describes a wide variety of nonlimiting cosmetic and pharmaceutical ingredients commonly used in the skin care industry, which are suitable for use in the compositions of the present invention. Nonlimiting examples of functional classes of ingredients are described at page 537 of this reference. Examples of these functional classes include: abrasives, anti-acne agents, anticaking agents, antioxidants, binders, biological additives, bulking agents, chelating agents, chemical additives, colorants, cosmetic astringents, cosmetic biocides, denaturants, drug astringents, emulsifiers, external analgesics, film formers, fragrance components, humectants, opacifying agents, plasticizers, preservatives, propellants, reducing agents, skin bleaching agents, skin-conditioning agents (emollient, humectants, miscellaneous, and occlusive), skin protectants, solvents, foam boosters, hydrotropes, solubilizing agents, suspending agents (nonsurfactant), sunscreen agents, ultraviolet light absorbers, and viscosity increasing agents (aqueous and nonaqueous). Examples of other functional classes of materials useful herein that are well known to one of ordinary skill in the art include solubilizing agents, sequestrants, and keratolytics, and the like.

TABLE I
Levels and Preferred Ranges for Antimicrobial Cleansing Compositions
Containing Surfactant Acids

Primary Surfactants	Class A and Class C	Class A and Class C	Class A and Class B
Surfactant Ratio Preferred	A:C -100:0 to 1.5:1	A:C -1.5:1 to 0:100	A:B - 100:0 to 0:100

Total Anionic Surfactant Preferred More Preferred	4% to 18% 4% to 12%	4% to 12% 4% to 10%	4% to 18% 4% to 12%
% primary surfactant (by wgt. of anionic surfactant) Preferred More Preferred	greater than 67% greater than 80% greater than 90%	greater than 67% greater than 80% greater than 90%	greater than 67% greater than 80% greater than 90%
Active Level Preferred	0.1% to 5.0% 0.1% to 1.0%	0.1% to 5.0% 0.1% to 1.0%	0.1% to 5.0% 0.1% to 1.0%
Proton Donating Agent Level Preferred More Preferred	0% to 8% 0.5% to 6% 1% to 4%	0% to 8% 0.5% to 6% 1% to 4%	0% to 8% 0.5% to 6% 1% to 4%
Surfactant Acid Level Preferred More Preferred Even more preferred Most preferred	0.1% to 10% 0.5% to 10% 1% to 10% 2% to 10% 5% to 10%	0.1% to 10% 0.5% to 10% 1% to 10% 2% to 10% 5% to 10%	0.1% to 10% 0.5% to 10% 1% to 10% 2% to 10% 5% to 10%
Composition pH Preferred More Preferred	3.0 to 5.5 3.5 to 5.0 3.5 to 4.5	3.0 to 5.5 3.5 to 5.0 3.5 to 4.5	3.0 to 5.5 3.5 to 5.0 3.5 to 4.5
Mildness Enhancing Cosurfactant Level - when used (by wgt. of anionic surfactant) Preferred More Preferred	20% to 70% 20% to 50%	20% to 70% 20% to 50%	20% to 70% 20% to 50%
Mildness Enhancing Polymer Level - when used Preferred More Preferred	0.1% to 1.0% 0.2% to 0.6%	0.1% to 1.0% 0.2% to 0.6%	0.1% to 1.0% 0.2% to 0.6%

TABLE 2
Levels and Preferred Ranges for Antimicrobial Cleansing Compositions
Containing Surfactant Acids

Primary Surfactants	Class B and Class C	Class B and Class C
Surfactant Ratio Preferred	BC - 100:0 to 1:2	B:C - 1:2 to 0:100
Total Anionic Surfactant Preferred	4% to 18%	4% to 12%
% primary surfactant (by wgt. of anionic surfactant) Preferred More Preferred	greater than 67% greater than 80% greater than 90%	greater than 67% greater than 80% greater than 90%
Active Level Preferred	0.1% to 5.0% 0.1% to 1.0%	0.1% to 5.0% 0.1% to 1.0%
Proton Donating Agent Level Preferred More Preferred	0% to 8% 0.5% to 6% 1% to 4%	0% to 8% 0.5% to 6% 1% to 4%
Surfactant Acid Level Preferred More Preferred Even more preferred Most preferred	0.1% to 10% 0.5% to 10% 1% to 10% 2% to 10% 5% to 10%	0.1% to 10% 0.5% to 10% 1% to 10% 2% to 10% 5% to 10%
Composition pH Preferred More Preferred	3.0 to 5.5 3.5 to 5.0 3.5 to 4.5	3.0 to 5.5 3.5 to 5.0 3.5 to 4.5
Mildness Enhancing Cosurfactant Level - when used (by wgt. of anionic surfactant) Preferred More Preferred	20% to 70% 20% to 50%	20% to 70% 20% to 50%
Mildness Enhancing Polymer Level - when used Preferred More Preferred	0.1% to 1.0% 0.2% to 0.6%	0.1% to 1.0% 0.2% to 0.6%

II. METHODS OF MANUFACTURE OF RINSE-OFF ANTIMICROBIAL CLEANSING COMPOSITION

The rinse-off antimicrobial personal cleansing compositions of the present invention are made via art recognized techniques for the various forms of personal cleansing products.

III. METHODS OF USING THE RINSE-OFF ANTIMICROBIAL CLEANSING COMPOSITION

The rinse-off antimicrobial personal cleansing compositions of the present invention are useful for personal cleansing, especially for cleansing of the hands. Typically, a suitable or

effective amount of the cleansing composition is applied to the area to be cleansed. Alternatively, a suitable amount of the cleansing composition can be applied via intermediate application to a washcloth, sponge, pad, cotton ball, puff or other application device. If desired, the area to be cleansed can be premoistened with water. The compositions of the present invention are combined with water during the cleansing process and rinsed-off from the skin. Generally, an effective amount of product to be used will depend upon the needs and usage habits of the individual. Typical amounts of the present compositions useful for cleansing range from about 0.1 mg/cm² to about 10 mg/cm², preferably from about 0.3 mg/cm² to about 3 mg/cm² skin area to be cleansed.

EXAMPLES

The following examples further describe and demonstrate embodiments within the scope of the present invention. In the following examples, all ingredients are listed at an active level. The examples are given solely for the purpose of illustration and are not to be construed as limitations of the present invention, as many variations thereof are possible without departing from the spirit and scope of the invention.

Ingredients are identified by chemical or CTFA name.

Liquid Handsoap	Weight %			
	1	2	3	4
Component				
Sodium Lauroyl Sarcosinate	8.00	0.00	0.00	0.00
Ammonium Lauroyl Sarcosinate	0.00	0.00	4.00	4.00
Ammonium Lauroyl Glutamate	0.00	6.00	0.00	0.00
Ammonium Lauryl Sulfate	5.00	2.60	5.00	5.00
Ammonium Laureth-3 Sulfate	3.50	0.00	0.00	0.00
Sodium Myristyl Sulfate	0.00	0.00	5.00	5.00
Sodium Lauroamphoacetate	5.25	0.00	3.00	3.00
Succinic Acid	0.00	2.00	4.00	4.00
Disodium Succinate	0.00	to pH 4.5	0.00	0.00
Polyquaternium 10	0.40	0.40	0.15	0.15
Sodium Hydroxide	to pH 4.0	0.00	to pH 5.5	to pH 5.5
Para-chloro-meta-xyleneol	1.50	0.00	0.00	0.00
Triclosan®	0.00	0.50	1.00	0.00
Thyme Oil	0.00	0.00	0.00	5.00
Perfume	1.0	1.0	0.00	0.00
Water	Q.S.	Q.S.	Q.S.	Q.S.

Procedure for Making Liquid Handsoap Examples

Add all but 5 weight percent water to mix tank. Add surfactants to mix tank. Heat materials to 155°F ±10°F and mix until dissolved. Cool to less than 100°F, add acid and antibacterial active and perfumes. Mix until materials are dissolved. Adjust pH to target with required buffer (NaOH or sodium salt of acid). Add remaining water to complete product.

Shower Gel Component	Weight %		
	1	2	3
Sodium or Ammonium Lauryl Sulfate	6.30	0.00	0.00
Sodium or Ammonium Laureth-3 Sulfate	4.20	10.00	0.00
Sodium or Ammonium Lauroamphoacetate	5.25	0.00	0.00
Sodium or Ammonium Lauryl Sarcosinate	8.00	2.00	4.00
Sodium Myristyl Sulfate	0.00	0.00	5.00
Sodium Olefin Sulfonate	0.00	0.00	5.00
Cocoamide MEA	2.80	0.00	0.00
Salicylic Acid	0.00	2.00	0.00
Triclocarban®	0.00	0.15	0.00
Triclosan®	1.00	0.25	0.00
Para-chloro-meta-xyleneol	0.00	0.00	2.00
Sodium Hydroxide	0.00	to pH 5.5	to pH 5
Sodium Citrate	to pH 4	0.00	0.00
Soybean Oil	8.00	0.00	0.00
Polyquaternium 10	0.30	0.30	0.00
Glycerine	3.40	0.00	0.00
Palmitic Acid	2.20	0.00	0.00
DMDM Hydantoin	0.14	0.00	0.14
Tetrasodium EDTA	0.13	0.10	0.13
Magnesium Sulfate	1.10	0.00	0.00
Sodium Chloride	0.00	1.00	1.00
Perfume	1.3	1.3	0.4
Dye	0.01	0.01	0.01
Water	Q.S.	Q.S.	Q.S.

Procedure for Making Shower Gels

Add moisturizing oils and co-surfactants together and heat ingredients to 130-140°F until dissolved (step can be skipped for products not containing oils). In another container add primary surfactants, acid, buffer salt, preservatives, viscosity builder (salt), and polymer. Heat to 130-140°F until dissolved. Combine two mixtures (or use single mixture if no oils are present) when both are 130-140°F, then begin cooling. When mixture is below 115°F, add, antibacterial active and perfume. Adjust final pH using NaOH or remaining buffer salt. Add remaining water to complete product.

Hair Shampoo Component	Wt%
Ammonium Lauryl Sulfate	6.90
Ammonium Laureth-3 Sulfate	9.60
Sodium Lauroamphoacetate	5.00
Sodium Laureth-3 Carboxylate	5.00
Salicylic Acid	2.00
Sodium Malate	to pH 5.0

Pyrithione Zinc	1.00
Polyquaternium 10	0.5
Perfume	1.0
Dye	0.01
Water	Q.S.

Procedure for Making Shampoo Examples

Add all but 5 weight percent water to mix tank. Add surfactants to mix tank. Heat materials to 155°F ±10°F and mix until dissolved. Cool to less than 100°F, add acid, antibacterial active, perfumes and dyes. Mix until materials are dissolved. Adjust pH to target with required buffer (sodium salt of acid). Add remaining water to complete product.

Liquid Laundry Detergent Component	Wt. %
C ₁₃ -C ₁₇ Sodium Paraffin Sulfonate	10.00
Laureth-8	5.00
Enzyme	1.00
Ethanol	4.00
Propylene Glycol	6.00
Polyquaternium-10	0.50
Sodium Lauroyl Sarcosinate	6.00
Triethanolamine	to pH 4.0
Triclosan®	1.00
Perfume	1.00
Water	Q.S.

Liquid Dish Detergent Component	Wt. %
C ₁₃ -C ₁₇ Sodium Paraffin Sulfonate	10.00
Sodium Laureth-3 Sulfate	5.00
Cocamidopropylhydroxysulfate	5.00
Polyquaternium-10	0.30
Sodium Lauroyl Glutamate	6.00
Sodium Hydroxide	to pH 4.5
Para-chloro-meta-xyleneol	1.50
Perfume	1.00
Water	Q.S.

Hard Surface Cleaner Component	Wt. %
C ₁₄ /C ₁₆ Sodium Alpha Olefin Sulfonate	4.00
Sodium Lauroyl Sarcosinate	4.00
Ammonium Hydroxide	to pH 3.5
o-phenylphenol	0.25
Perfume	1.00
Water	Q.S.

Procedure for Making Above Examples

Add all but 5 weight percent water to mix tank. Add surfactants to mix tank. Heat materials to 155°F ±10°F and mix until dissolved. Cool to less than 100°F, add acid, active and perfume. Mix until materials are dissolved. Measure and adjust pH to target with required buffer (NaOH or sodium salt of acid). Add remaining water to complete product.

WHAT IS CLAIMED IS:

1. A rinse-off antimicrobial cleansing composition characterized in that it comprises:
 - a. from 0.1% to 5.0%, by weight of the cleansing composition, of an antimicrobial active;
 - b. from 4% to 18%, by weight of the cleansing composition, of an anionic surfactant, wherein at least 67% of the anionic surfactant is selected from the group consisting of Class A surfactants, Class C surfactants, and mixtures thereof, wherein the ratio of Class A surfactant to Class C is from 100:0 to 1.5:1;
 - c. from 0.1% to 10%, by weight of the cleansing composition, of a Class D acidic surfactants;
 - d. from 69.4% to 84.9%, by weight of the cleansing composition, of water; wherein the composition is adjusted to a pH of greater than 3.0 and less than 5.5.
2. A rinse-off antimicrobial cleansing composition characterized in that it comprises:
 - a. from 0.1% to 5.0%, by weight of the cleansing composition, of an antimicrobial active;
 - b. from 4% to 12%, by weight of the cleansing composition, of an anionic surfactant, wherein at least 67% of the anionic surfactant is selected from the group consisting of Class A surfactants, Class C surfactants, and mixtures thereof, wherein the ratio of Class A surfactant to Class C is from 1.5:1 to 0:100;
 - c. a mildness enhancing agent; and
 - d. from 72.4% to 86.1%, by weight of the cleansing composition, of water; wherein the composition is adjusted to a pH of greater than 3.0 and less than 5.5.
3. A rinse-off antimicrobial cleansing composition characterized in that it comprises:
 - a. from 0.1% to 5.0%, by weight of the cleansing composition, of an antimicrobial active;
 - b. from 4% to 18%, by weight of the cleansing composition, of an anionic surfactant, wherein at least 67% of the anionic surfactant is selected from the group consisting of Class A surfactants, Class B surfactants, and mixtures thereof;
 - c. from 0.1% to 10%, by weight of the cleansing composition, of a Class D acidic surfactants;
 - d. from 75.4% to 88.1%, by weight of the cleansing composition, of water; wherein the composition is adjusted to a pH of greater than 3.0 and less than 5.5.

4. A rinse-off antimicrobial cleansing composition characterized in that it comprises:
 - a. from 0.1% to 5.0%, by weight of the cleansing composition, of an antimicrobial active;
 - b. from 4% to 18%, by weight of the cleansing composition, of an anionic surfactant, wherein at least 67% of the anionic surfactant is selected from the group consisting of Class B surfactants, Class C surfactants, and mixtures thereof, wherein the ratio of Class B surfactant to Class C is from 100:0 to 1:2;
 - c. a mildness enhancing agent; and
 - d. from 72.4% to 86.1%, by weight of the cleansing composition, of water;wherein the composition is adjusted to a pH of greater than 3.0 and less than 5.5.
5. A rinse-off antimicrobial cleansing composition characterized in that it comprises:
 - a. from 0.1% to 5.0%, by weight of the cleansing composition, of an antimicrobial active;
 - b. from 4% to 12%, by weight of the cleansing composition, of an anionic surfactant, wherein at least 67% of the anionic surfactant is selected from the group consisting of Class B surfactants, Class C surfactants, and mixtures thereof, wherein the ratio of Class B surfactant to Class C is from 1:2 to 0:100;
 - c. a mildness enhancing agent; and
 - d. from 72.4% to 86.1%, by weight of the cleansing composition, of water;wherein the composition is adjusted to a pH of greater than 3.0 and less than 5.5.
6. A rinse-off antimicrobial cleansing composition according to either of Claim 1 or Claim 3 further comprising a mildness enhancing agent.
7. A rinse-off antimicrobial cleansing composition according to any of Claims 2, Claim 3, Claim 5 or Claim 6 wherein the mildness enhancing agent is selected from the group consisting of from 0.1% to 1.0%, by weight of the cleansing composition, of a mildness enhancing polymer, from 20% to 70%, by weight of the anionic surfactant, of a mildness enhancing cosurfactant, and mixtures thereof.

8. A rinse-off antimicrobial cleansing composition according to Claim 7 wherein the mildness enhancing agent comprises from 0.2% to 0.6%, by weight of the cleansing composition, of a mildness enhancing polymer and from 20% to 50%, by weight of the anionic surfactant, of a mildness enhancing cosurfactant.
9. A rinse-off antimicrobial cleansing composition according to any of the preceding claims wherein the antimicrobial active is selected from the group consisting of Triclosan®, Triclocarban®, Octopirox®, PCMX, ZPT, natural essential oils and their key ingredients, and mixtures thereof.
10. A rinse-off antimicrobial cleansing composition according to any of the preceding claims further comprising from 0% to 8%, by weight of the cleansing composition, of a proton donating agent having a Biological Activity Index, Z, of greater than 0.75.
11. A rinse-off antimicrobial cleansing composition according to Claim 7 wherein the proton donating agent is an organic acid having a Biological Activity Index, Z, of greater than 1.5.
12. A rinse-off antimicrobial cleansing composition according to any of the preceding claims wherein the ratio of the amount of non-anionic surfactants to the amount of anionic surfactant is less than 1:1.
13. A method for cleansing, reducing the number of germs and decreasing the spread of transient Gram negative and Gram positive bacteria comprising the use of a safe and effective amount of the composition of any of the preceding claims on human skin.
14. A method for treating acne comprising the use of a safe and effective amount of the composition of any of the preceding claims on human skin.

INTERNATIONAL SEARCH REPORT

Internat I Application No

PCT/US 98/11012

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A61K7/50 C11D3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A61K C11D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	GB 2 288 811 A (PROCTER & GAMBLE) 1 November 1995 see the whole document ---	1-14
A	WO 96 17592 A (PROCTER & GAMBLE) 13 June 1996 see the whole document ---	1-14
A	WO 96 32919 A (PROCTER & GAMBLE) 24 October 1996 see examples 1-20 ---	1-14
A	WO 97 14406 A (PROCTER & GAMBLE) 24 April 1997 see examples 2,6 ---	1-14
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Couckuyt, P

INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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